Calculus –1 MAC 2311

Name_____

Review for Test–3

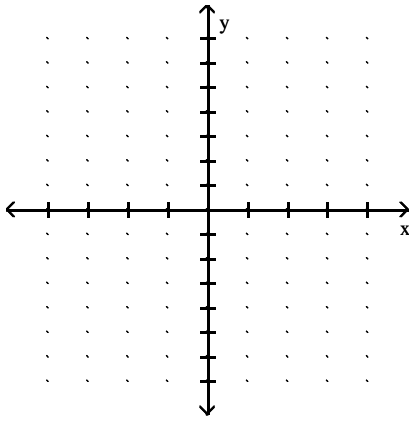
----------Review

Provide an appropriate response.

1) Find the critical values and determine the intervals where f(x) is increasing and the intervals where f(x) is decreasing for the function $f(x) = x^3 + 3x^2 - 24x + 6$.

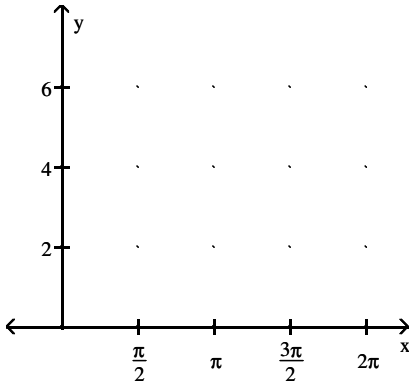
Graph the equation. Include the coordinates of any local and absolute extreme points and inflection points.

2) $y = 2x^3 - 3x^2 - 12x$



Sketch the graph and show all local extrema and inflection points.

3) $y = x - \sin x,\ 0 \le x \le 2\pi$



Use l'Hopital's Rule to evaluate the limit.

4) $\lim_{x \to 0} \dfrac{\cos 9x - 1}{x^2}$

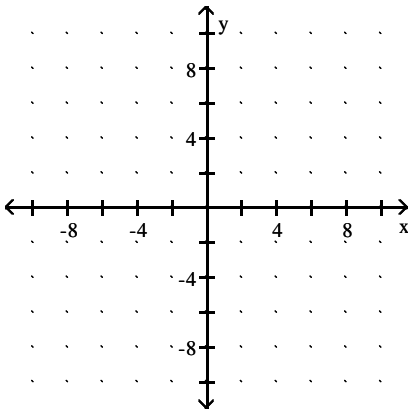
5) $\lim_{x \to \infty} \dfrac{13x^2 + 6x - 2}{14x^2 - 2x + 14}$

Use l'Hôpital's rule to find the limit.

6) $\lim_{x \to \infty} x \sin \dfrac{16}{x}$

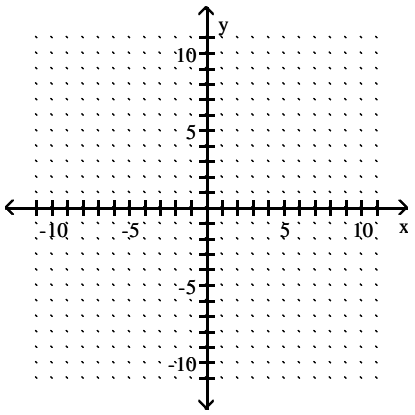
Graph the rational function.

7) $y = \dfrac{x - 2}{x^2 - 3x + 2}$



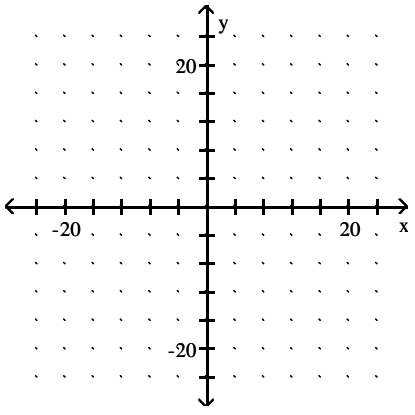
Sketch the graph and show all local extrema and inflection points.

8) $y = -x^4 + 2x^2 - 10$



Graph the rational function.

9) $y = \dfrac{x^3}{x^2 - 25}$



Find the limit.

10) $\lim\limits_{x \to 0^+} x^{-4/\ln x}$

11) $\lim_{x \to \infty} \left(1 + \frac{2}{x^4}\right)^x$

12) $\lim_{x \to 0} (e^{5/x} + 1x)^{x/2}$

Solve the problem.

13) Use Newton's method to estimate the one real solution of the equation $5x^5 - 2x - 3 = 0$. Start with $x_1 = 1$. Then, in each case find x_2.

14) Use Newton's method to estimate the solution of the equation $3\sin x - 4x + 1 = 0$. Start with $x_1 = 1.5$. Then, in each case find x_2.

Use Newton's method to estimate the requested solution of the equation. Start with given value of x_0 and then give x_2 as the estimated solution.

15) $x^3 + 5x + 2 = 0$; $x_0 = -1$; Find the one real solution.

Solve the problem.

16) A company wishes to manufacture a box with a volume of 20 cubic feet that is open on top and is twice as long as it is wide. Find the width of the box that can be produced using the minimum amount of material. Round to the nearest tenth, if necessary.

17) A rectangular field is to be enclosed on four sides with a fence. Fencing costs $5 per foot for two opposite sides, and $8 per foot for the other two sides. Find the dimensions of the field of area 750 square feet that would be the cheapest to enclose.

18) A 60 room hotel is filled to capacity every night at a rate of $40 per room. The management wants to determine if a rate increase would increase their profit. They are not interested in a rate decrease. Suppose management determines that for each $2 increase in the nightly rate, five fewer rooms will be rented. If each rented room costs $8 a day to service, how much should the management charge per room to maximize profit?

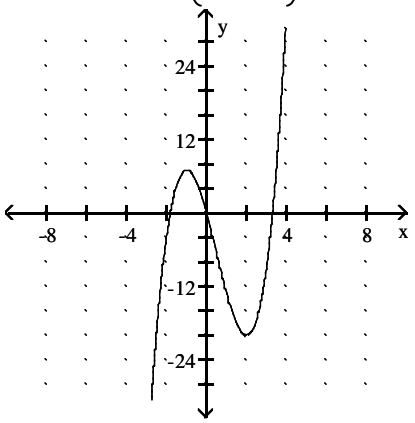
Find f(x) given f''(x). Your answer will involve two arbitrary constants.

19) $f''(x) = 7x + 6$

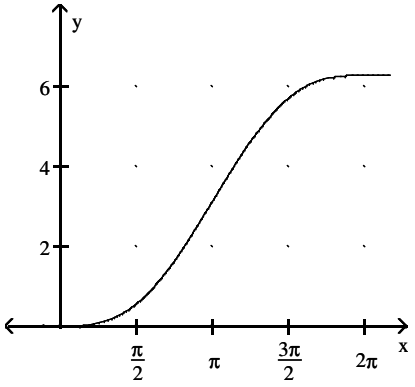
Find the general antiderivative F(x) + C for the function.

20) $f(x) = \frac{8x^7 + 5x^5}{x^4}$

1) increasing on $(-\infty, -4)$ and $(2, \infty)$; decreasing on $(-4, 2)$
2) local minimum: $(2, -20)$
   local maximum: $(-1, 7)$
   inflection point: $\left(\frac{1}{2}, -\frac{13}{2}\right)$



3) Local minimum: $(0, 0)$
   Local maximum: $(2\pi, 2\pi)$
   Inflection point: (π, π)

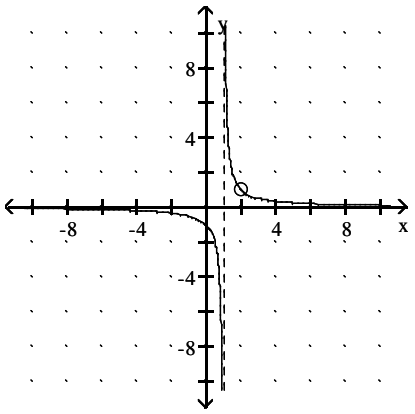


4) $-\frac{81}{2}$

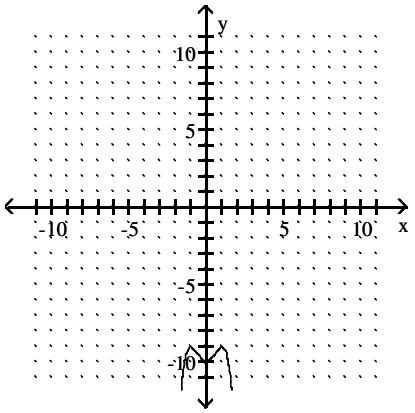
5) $\frac{13}{14}$

6) 16

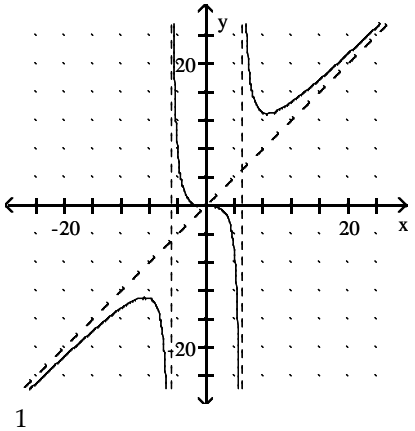
7)



8) Absolute maxima: (–1, –9), (1, –9)
Local minimum: (0, –10)
Inflection points: $\left(-\sqrt{\frac{1}{3}}, 1\right), \left(\sqrt{\frac{1}{3}}, 1\right)$



9)



10) $\frac{1}{e^4}$

11) 1

12) $e^{2.5}$

13) $f(x) = 5x^5 - 2x - 3$, $f'(x) = 25x^4 - 2$

$x_1 = 1$

$$x_{n+1} = x_n - \frac{5x^5 - 2x - 3}{25x^4 - 2} = \frac{20x^5 + 3}{25x^4 - 2}$$

therefore $x_2 = 1.0000$

14) $f(x) = 3\sin x - 4x + 1$

$f'(x) = 3\cos x - 4$

$x_1 = 1.5$

$$x_{n+1} = \frac{3x\cos x - 3\sin x - 1}{3\cos x - 4}$$

therefore x_2 must be 0.96998337

15) −0.44

16) 2.4 ft

17) 34.6 ft at $5 by 21.7 ft at $8

18) The management should leave the rate as it is.

19) $f(x) = \frac{7}{6}x^3 + 3x^2 + C_1x + C_2$

20) $2x^4 + \frac{5}{2}x^2 + C$