Test 1 MAT2601 (Test)

Question 1

$$\frac{d}{dt}\left(3t^{\frac{11}{3}}\right) = 11t^{\frac{8}{3}}$$

$$\frac{d}{dt}\left(-2t^{\frac{9}{4}}\right) = -\frac{9}{2}t^{\frac{5}{4}}$$

$$\frac{d}{dt}\left(-t^{\frac{1}{2}}\right) = -\frac{1}{2}t$$

$$\frac{d}{dt}(4) = 0.$$

$$z' = 11t^{\frac{8}{3}} - \frac{9}{2}t^{\frac{5}{4}} - \frac{1}{2}t^{-\frac{1}{2}}$$

Question 2.

Absolute minimum: $(10, -697)$

Absolute maximum: $(-4, 115)$

Question 3

$$y' = 4x^2(4x^5 - 13)^2(24x^4 - 13)$$

Question 4

(a) $124x - 0.4x^2$

(b) 110 hundred subscribers.
8800 hundred dollars.

(c) decreasing

(d) 36 hundred dollars per hundred subscribers.

... the revenue increase by $\boxed{36}(100) = \$\boxed{3600}$

The revenue can be increased by lowering the monthly charges.

Question 5

(a) Relative maxima: $(-1, 7)$

Relative minima: $(1, 3)$

horizontal points of inflection: $(0, 5)$

(b) ~~$x = -1, 0, +1$~~ ~~$-1, 1$~~ $x = -1, 1$

(c) ~~$(-1, 7)$~~ $(-1, 7)$ - smallest x.
~~$(0, 5)$~~
~~$(-1, 3)$~~ $(1, 3)$ - largest x.
$(1, 3)$ - smallest y
$(-1, 7)$ - largest y

Question 6.

$$\frac{1-q+\sqrt[4]{q}\cdot q^{\frac{3}{4}}}{q^{\frac{3}{4}}(1-q)^2}$$

Question 7

$$\frac{x+3}{\sqrt{x^2+6x}}$$

Question 8.

(a) 10

(b) D.N.E

Question 9.

$$y' = (x^2+x+3)\left(\frac{1}{3x^{\frac{2}{3}}} - \frac{1}{2x^{\frac{1}{2}}}\right) + (2x+1)\left(\sqrt[3]{x} - 2\sqrt{x} + 7\right)$$

Question 10.

(a) $f'(x) = 8x - 3$

(b) -11

(c) -11

(d) $(-1, 7)$

Question 11

$y = 50x - 26$

Question 12

360

Question 13

(a) $X = 2600$ hammers.
$\$ 67600$

(b) $\$ 42000$

Question 14

480 ft/sec.

Question 15

(a) $f(-4) =$ DNE

$\lim_{x \to -4} f(x) = \frac{9}{4}$

The function is discontinous at $x = -4$.

Question 16

$$y' = 2x\sqrt[4]{4x-9} + \frac{x^2}{(4x-9)^{3/4}}$$

Question 17

horizontal asymptote: $y = 9$

Vertical asymptote: $x = 6$.

Question 18

~~$g'(x) = 12x^3 - 15x^2 + 13$.~~

$g'(x) = 12x^3 - 15x^2 + 13$.

$g''(x) = 36x^2 - 30x$.

$g''(3) = 234$

$g''(\frac{1}{3}) = -6$.

(a) concave up

(b) concave down.

Question 19

(a) concave down.

(b) concave up.

Question 20.

$$y'' = \frac{250x + 6}{25x^{\frac{8}{5}}}$$

OR

$$y'' = 10 + \frac{9}{x^{\frac{8}{5}}}$$