S.A. part

#13 Polynomial of degree 3 with $4, 2i, -2i$ as zeros

$(A - B)(A + B)$

$f(x) = (x-4)\boxed{(x-2i)(x+2i)}$

$= (x-4)(x^2-(2i)^2)$

$= (x-4)(x^2+4)$

$= \boxed{x^3-4x^2+4x-16}$

#14 $f(x) = \dfrac{x^2+3x-18}{x^2-4x-21}$. Domain?

Set bottom $= 0$ $\quad x^2-4x-21=0$

$(x-7)(x+3)=0 \rightarrow x=7, x=-3$

Domain: $\boxed{(-\infty,-3)\cup(-3,7)\cup(7,\infty)}$

or $\boxed{\{x \mid x \neq 7 \text{ and } x \neq -3\}}$

$f(x)$

Tuesday, November 27, 2018 1:38 PM

(+) and "="

#15 $x^2+6x-4 \geq 0$

Find critical values : $x^2+6x-4=0$

$$x = \frac{-6 \pm \sqrt{36-4\cdot 1\cdot(-4)}}{2}$$

$$x = \frac{-6 \pm \sqrt{52}}{2} = \frac{-6 \pm \sqrt{13\cdot 4}}{2}$$

$$x = \frac{-6 \pm 2\sqrt{13}}{2} = \boxed{-3 \pm \sqrt{13}}$$ critical values

Intervals	$(-\infty, -3-\sqrt{13})$	$(-3-\sqrt{13}, -3+\sqrt{13})$	$(-3+\sqrt{13}, \infty)$
Test points	-10	0	10
Sign of f	(+)	(−)	(+)

Solution set : $(-\infty, -3-\sqrt{13}] \cup [-3+\sqrt{13}, \infty)$

#16 $f(x) = -4x - 3$; $g(x) = 6x^2 + 9x - 8$

$$(f \circ g)(2) = f(g(2))$$

$$g(2) = 6 \cdot (2)^2 + 9 \cdot (2) - 8 = 34$$

$$f(g(2)) = f(34) = -4 \cdot 34 - 3 = -139$$

#17 $\log_b \sqrt{b^7} = \log_b b^{\frac{7}{2}} = \frac{7}{2}$

Log and Exp are inverses.

#18 $\log_b \sqrt{\frac{x^9 y^2}{z^8}} = \log_b \left(\frac{x^9 y^2}{z^8}\right)^{\frac{1}{2}}$

$$= \frac{1}{2} \log_b \left(\frac{x^9 y^2}{z^8}\right) = \frac{1}{2}\left[9 \log_b x + 2 \log_b y - 8 \log_b z\right]$$

Power Rule

Power, quotient, product

$$= \frac{9}{2}\log_b x + \log_b y - 4\log_b z$$

Essay part

#19 $4x^3 - 11x^2 \leq 20x$ ⊖ and "="

$4x^3 - 11x^2 - 20x \leq 0$

$f(x)$

Find critical values: $4x^3 - 11x^2 - 20x = 0$

$x(4x^2 - 11x - 20) = 0$

$x(4x + 5)(x - 4) = 0$

$x = 0;\ x = -\frac{5}{4};\ x = 4$

Intervals	$(-\infty, -\frac{5}{4})$	$(-\frac{5}{4}, 0)$	$(0, 4)$	$(4, \infty)$
Test value	-2	-1	1	5
Sign	⊖	⊕	⊖	⊕

Solution set: $\boxed{(-\infty, -\frac{5}{4}] \cup [0, 4]}$

#20 $\ln(x^2 - 49) - \ln(x+7)$

$= \ln\left(\frac{x^2-49}{x+7}\right) = \ln\left(\frac{(x+7)(x-7)}{x+7}\right)$

Quotient

$= \boxed{\ln(x-7)}$