

Math 1172 Homework #9

23, 24, 54, 60

23 $3 - 4 + \frac{16}{2} - \dots$

$a = 3$

$r = -\frac{4}{3}$ $|r| > 1$, so it diverges

24 $4 + 3 + \frac{9}{4} + \dots$

$a = 4$

$r = \frac{3}{4}$ $|r| < 1$, so it converges

to $\frac{a}{1-r} = \frac{4}{1-\frac{3}{4}} = 16$

54

$0.\overline{46}4646\dots$

$\frac{46}{100} + \frac{46}{10000} + \dots$

$a = \frac{46}{100}$

$r = \frac{\frac{46}{10000}}{\frac{46}{100}} = \frac{46}{10000} \cdot \frac{100}{46} = \frac{1}{100}$

$|r| < 1$ so it converges

$0.\overline{46} = \frac{a}{1-r} = \frac{\frac{46}{100}}{1 - \frac{1}{100}} = \frac{\frac{46}{100}}{\frac{99}{100}} = \boxed{\frac{46}{99}}$

#60 $\sum_{n=1}^{\infty} (x+2)^n$ For which x does it converge?

$$= (x+2) + (x+2)^2 + \dots$$

$$a = x+2$$

$$r = \frac{(x+2)^2}{x+2} = x+2$$

Converges when $|r| < 1$, i.e. when $|x+2| < 1$,

$$\text{i.e. } -1 < x+2 < 1$$

$$-3 < x < -1.$$

For those x , it converges to

$$\frac{a}{1-r} = \frac{x+2}{1-(x+2)} = \frac{x+2}{-x}$$